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SMALL SAMPLE STUDIES OF FOOD HABITS: I. THE RELATIONSHIP BETWEEN FOOD PREFERENCE AND FOOD CHOICE IN NAVAL ENLISTED PERSONNEL AT THE NAVAL CONSTRUCTION BATTALION CENTER, DAVISVILLE, RHODE ISLAND

by

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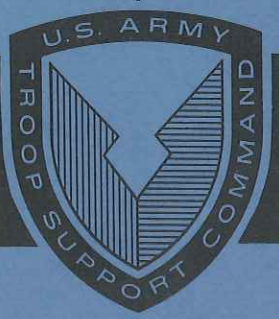

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This study is the first in a series of small sample studies on individual food habits. Food preference and food choice were examined in detail for 10 Navy enlisted men. Results showed that while individuals are rather similar in the consistency of their responses to foods overall, they are somewhat different when their responses to foods within a given food class are considered. This was true with respect to the reliability of the hedonic and frequency scales, the degree of association between the hedonic and frequency scales, and the degree of association between these preference scales and food choice.

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Since this is to be the first study in a series, the results are of limited practical value at this point in time, but will have more practical implications after more studies in the series have been completed and a larger subject pool has been obtained.

TR-75-52-FSL

SMALL SAMPLE STUDIES OF FOOD HABITS:

I. THE RELATIONSHIP BETWEEN FOOD PREFERENCE AND FOOD CHOICE IN NAVY ENLISTED PERSONNEL AT THE NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE, RHODE ISLAND

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ABSTRACT

This study is the first in a series of small sample studies on individual food habits. In contrast to past studies, which have focused on average group responses, this study was designed to provide a detailed analysis of the food related behaviors of individual subjects. In addition, an attempt was made to determine the relationship between expressed food preferences, assessed with a food questionnaire, and actual food choice in a dining hall.

Food preferences and food choice were examined in detail for 10 Navy enlisted men stationed at the Naval Construction Battalion Center at Davisville, Rhode Island. Results showed that when all foods were considered at once individuals were similar in how reliable they were over time in stating their food preferences. However, the reliability per se of individual responses was not nearly as high as the reliability of averaged groups responses. Additionally, individual subjects were somewhat similar in the degree to which they rated foods in the same rank order of preference on hedonic and frequency scales of food preference, and the overall correlation between hedonic and frequency scale ratings was much higher than previously reported.

The subjects were consistent in showing moderately low correlations between food preference ratings and food choice across all foods. When individual food classes were considered, however, individuals differed markedly with variability in some food classes being much higher than in others.

In general, it appears that individual food related responses of subjects are not nearly as consistent as reports based on averaged group data would indicate.

Since this is to be the first study in a series, the results are of limited practical value at this point in time. However, as more studies in the series are completed we will be able to answer more practical questions, such as whether or not a population of subjects can be divided into subsets of individuals having unique food habits, and whether individuals who show high agreement between food preference and actual food choice differ in some other qualitative way from individuals for whom food preference and food choice seem to be poorly related.

INTRODUCTION

Menu planning is one of the most important functions in any large scale institutional feeding system. In the military, large scale menu planning is necessary to minimize waste for cost efficiency and to maximize nutrition and acceptability of available menu items. Since WWII the military services have given increasing consideration to the role of hedonics, or personal likes and dislikes, in menu planning.

Assessment of individual food preferences is well summarized in two large reports from the Quartermaster Food and Container Institute of the Armed Forces (Peryam, Polemis, Kamen, Eindhoven, and Pilgrim, 1960; Kamen, Peryam, Peryam, and Kroll, 1963) and more recently in a report from the U.S. Army Natick Laboratories (Meiselman, Van Horne, Hasenzahl, and Wehrly, 1972). The technique that was most commonly used in the assessment of food preferences in these studies was the 9 category hedonic scale. This involved having individuals state on a 1 to 9 scale their degree of like or dislike of individual food items (1 – dislike extremely, 5 – neither like nor dislike, 9 – like extremely). In the report by Meiselman, et al (1972) an additional measure of food preference was systematically used; viz, frequency, or how many days a week and how many weeks a month one would like a food to be served.

These measures of food preference and acceptability have appeared to be very reliable over time when used with large numbers of subjects (Peryam, et al, 1960) although the association between the hedonic and frequency scales does not appear to be high (Meiselman, et al, 1972).

An important question which arises regarding these measures of food preference is that of validity; i.e., the extent to which they indicate what foods a given individual will actually choose in a dining situation. Put another way, one wonders to what extent a person actually chooses to eat those foods that he most likes. If there is high concordance between results on the preference scales and actual food choice, then one is highly justified in using the scales to help in menu planning. But if the relationship is low, then the use of hedonic and frequency rating scales in menu planning should be seriously reconsidered.

One neglected area of research in the study of food preferences and food consumption concerns individual food habits. To date most food preference research in the military has focused on the attitudes and behaviors of groups of individuals. For instance, the reliability of previous food preference surveys has ranged from +0.95 to +0.99 (Peryam, et al, 1960). These correlations were arrived at by calculating the mean response of individuals to each food and then comparing across foods. This gives an indication of the stability of an average group response but says little about the reliability of individual responses within the group. Recent work at Natick Laboratories has in fact indicated that individual reliability may actually be much lower than group reliability. One such study showed that the average of the test-retest reliability coefficients of 123 individuals was +0.60 for the hedonic scale and +0.58 for the frequency scale (Waterman, Meiselman, Branch, and Taylor, 1974). In both cases the test-retest reliability for individual subjects

varied from −0.07 to +0.92. It would thus appear that a detailed study of the food related responses of the individual subject would be warranted at this time in order to determine to what extent the results of group studies are representative of the attitudes and behaviors of individuals per se.

The following study was conducted on a small sample of individuals in an attempt to help answer four main questions: 1) How reliable are the hedonic and frequency scales? 2) What is the extent of association between the hedonic and frequency scales? 3) To what extent are hedonic and frequency scale ratings in concordance with the actual food choice of a given individual? and 4) To what extent are there individual differences with respect to the above three questions?

METHOD

Subjects

The subjects were 10 Navy enlisted personnel, 19 – 25 years old, stationed with the Naval Construction Battalion at Davisville, Rhode Island. All subjects volunteered to participate in the study.

Procedure

Phase I: The subjects were first given a food preference questionnaire for specific single food items which would be served during Phase II. The questionnaire contained 143 foods which the subjects were asked to rate using the standard 9 point hedonic scale (Peryam & Pilgrim, 1957) and a recently tested 30 point frequency scale (Natick's Fort Lewis project). The hedonic scale was used to obtain a measure of a person's liking of a food whereas the frequency scale was used as a measure of how often one desires to eat a given food. If a subject had never tried a food item he was asked to so indicate. An example of the format used in presenting the scales is given in Appendix A. Complete forms of all questionnaires are in Appendix D.

After completing this first task the subjects were then given a food preference questionnaire for food selections from menus. This consisted of ten menus, one each representing lunch and dinner for the five days of Phase II. Subjects were asked to indicate on each menu what foods they would select for each meal from the foods listed on that menu. An example of a menu is shown in Appendix B. These menus were also used in subsequent phases of the experiment.

After completing this, each subject filled out a questionnaire in which he gave demographic information about himself (Appendix C).

Phase II: During Phase II the subjects ate lunch and dinner for five days at a specified location in the dining hall. When a subject arrived for his meal he first examined foods on the serving line and then was given a menu (Appendix B) from which he selected the food items he wanted for that meal. The items the subject had chosen were placed on separate plates and the weight of each food was determined out of sight of the subject. The food was served and any food left at the end of the meal was again weighed in order to obtain an accurate estimate of the amount of food consumed by each subject. Each person was allowed as many servings of an item as he desired. At no time was he told that his food intake was being measured

Immediately after the completion of each meal, subjects filled out a meal evaluation form in order to obtain an overall estimate of the quality of the food served at that meal.

Phase III: One week after the completion of Phase II the subjects again filled out food preference questionnaires like those they had filled out in Phase I; i.e., the food preference questionnaire for single food items (Appendix A) and the food preference questionnaire for food selections from menus (Appendix B). Subjects 6 and 9 did not complete this phase of the experiment. Phase I and III data from the questionnaire for food selections from menus were not analyzed for this report. Also, neither the demographic data nor the consumption data were analyzed at this time (see Appendix D for complete surveys).

Data Analysis

Correlation was the statistical technique chosen for analysis of the data. Although the method of using the hedonic scale was presented to the subjects so as to encourage their using it as an interval scale (i.e. each category was given a label expressing a degree of likeability) the subjects were not explicitly instructed to treat the scale as an interval scale with equal distance between categories. Thus, a conservative approach was adopted and it was assumed that subjects merely used the scale ordinally. This required the use of nonparametric correlation techniques (Spearman's rho).

Reliability of the hedonic scale was determined by correlating the hedonic ratings given in Phase I with the ratings given in Phase III. For each man, correlation coefficients were calculated for food groups; viz., Soup, Salad, Entree, Starch, Vegetable, Bread, Dessert, and Beverage, as well as overall for All Foods. Reliability coefficients were similarly determined for the frequency scale.

A measure of association between the hedonic and frequency scales was obtained by correlating hedonic ratings with frequency ratings of a food. This also was done for each man in terms of food groups as well as overall, across all foods. In addition, these measures of association were determined for the ratings given in Phase I as well as for the ratings given in Phase III.

Finally, the extent to which food preference ratings indicate whether or not a given food item is chosen was determined by calculating for each man a correlation between the hedonic rating of a food and the likelihood of choosing that food during a meal, and by computing a correlation between the frequency rating of a food and the likelihood of choosing that food. (The likelihood of choosing a food was determined by dividing the number of meals that the food was chosen by the number of meals during which the food was available). This was done for each food group as well as overall across all foods. Also, the correlation coefficients were calculated for the ratings obtained in Phase I as well as for those obtained in Phase III.

RESULTS

The reliability coefficients for the hedonic scale are shown in the left panel of Table I. (Since subjects 6 and 9 did not complete Phase III, reliability coefficients could not be computed for them.) Although the range of the correlation coefficients across the various food groups was quite large for most subjects, (from −0.56 to +0.93 in one case) the correlations over All Foods were relatively high with most of them falling around +0.75. One marked exception was subject 5 who had an overall correlation of +0.23. (This subject, it should be noted, stated that he had not tried a sizeable proportion of the foods listed.) The median of the overall correlations was +0.74. The range of the correlations across individuals for each food group was also quite large, although the median correlations for the food groups were rather high, frequently around +0.70.

A similar situation occurred for the frequency reliability coefficients (right panel of Table I). The range of the coefficients across foods and individuals was large. The overall correlations over all foods clustered around +0.60, with the median of the overall correlations being +0.64. The medians of the correlations across individuals showed a large range, from +0.21 for Desserts to +0.87 for Breads. These correlations should be interpreted cautiously, however, since there was a small number of items to be rated in some of the food groups, e.g. Soups, Salads, and Breads.

Table II shows the correlations between ratings on the hedonic scale and ratings on the frequency scale. The left panel shows the ratings given in Phase I and the right panel shows the ratings given in Phase III. Again, the variability of the correlations was quite large within individuals as well as within food groups. The association between the two scales was about the same for both Phase I and Phase III ratings, as is shown by median overall correlations of +0.69 for Phase I and +0.68 for Phase III.

In summary, although there is a moderate degree of association between the hedonic and frequency scales, the former seems to be slightly more reliable than the latter.

The correlations between the preference ratings and the likelihood of choosing a food are shown in Tables III and IV. Table III shows correlations based on Phase I ratings and Table IV shows correlations based on Phase III ratings. With the marked exception of subject 5, most of the correlations involving the hedonic scale were in the range of +0.40 to +0.60, with the medians of the overall correlations being +0.50 and +0.44 for Phases I and III, respectively.

The correlations involving the frequency scale were somewhat lower. Most of the overall correlations, for both Phase I and Phase III were in the +.30's with the median of the overall correlations being +0.30 and +0.34, respectively.

TABLE I

Individual Reliability Coefficients (rho) for the Hedonic Scale and Frequency Scale (number of foods rated is given in parentheses)

Food Group	Hedonic Scale — Subject #									Frequency Scale — Subject #								
	1	2	3	4	5	7	8	10	Median	1	2	3	4	5	7	8	10	Median
Soup	+0.89 (5)	+0.18 (6)	+0.52 (6)	+0.56 (6)	+0.50 (2)	+0.90 (8)	+0.50 (9)	+0.91 (7)	+0.54	+0.14 (6)	+0.36 (7)	+0.29 (7)	+0.26 (5)	−0.10 (7)	+0.76 (8)	+0.40 (5)	+0.77 (4)	+0.32
Salad	+0.82 (4)	+0.88 (6)	+0.42 (6)	+0.64 (5)	+0.24 (4)	+0.83 (6)	+0.19 (5)	+0.86 (6)	+0.73	+0.41 (5)	+0.78 (6)	+0.79 (6)	+0.79 (5)	+0.82 (4)	+0.86 (6)	+0.87 (5)	+0.81 (6)	+0.80
Entreé	+0.66 (23)	+0.92 (26)	+0.68 (28)	+0.84 (25)	+0.19 (18)	+0.72 (25)	+0.77 (26)	+0.79 (25)	+0.74	+0.57 (24)	+0.46 (24)	+0.66 (28)	+0.79 (25)	+0.07 (19)	+0.77 (27)	+0.46 (25)	+0.78 (25)	+0.62
Starch	+0.74 (9)	+0.88 (12)	+0.90 (12)	+0.50 (12)	−0.37 (6)	+0.83 (11)	+0.83 (10)	+0.60 (9)	+0.78	+0.73 (9)	+0.87 (12)	+0.83 (11)	+0.56 (12)	−0.85 (6)	+0.78 (12)	+0.66 (8)	+0.91 (10)	+0.76
Vegetable	+0.83 (9)	+0.95 (15)	+0.70 (11)	+0.51 (13)	+0.08 (10)	+0.53 (11)	+0.79 (17)	+0.89 (13)	+0.74	+0.49 (12)	+0.58 (10)	+0.33 (12)	+0.33 (11)	−0.48 (11)	+0.63 (14)	+0.55 (11)	+0.74 (8)	+0.52
Bread	+0.87 (5)	+0.41 (5)	+0.41 (5)	0.0 (5)	+0.73 (5)	+0.83 (5)	−0.56 (5)	−0.25 (5)	+0.41	+0.80 (5)	+0.92 (5)	+0.87 (5)	+0.92 (5)	+0.87 (5)	+1.00 (5)	+0.67 (5)	+0.30 (5)	+0.87
Beverage	+0.30 (16)	+0.60 (14)	+0.71 (15)	+0.37 (15)	+0.37 (12)	+0.88 (16)	+0.93 (15)	+0.70 (16)	+0.65	+0.26 (16)	+0.89 (14)	+0.64 (14)	+0.50 (15)	+0.56 (15)	+0.65 (16)	+0.77 (11)	+0.87 (15)	+0.64
Dessert	+0.81 (24)	+0.60 (23)	+0.66 (25)	+0.27 (21)	−0.37 (9)	+0.61 (24)	+0.76 (25)	+0.59 (21)	+0.60	+0.21 (24)	+0.21 (23)	+0.62 (24)	+0.20 (21)	−0.61 (14)	+0.02 (22)	+0.39 (22)	+0.69 (14)	+0.21
All Foods	+0.74 (101)	+0.78 (113)	+0.70 (114)	+0.57 (111)	+0.23 (70)	+0.75 (112)	+0.81 (118)	+0.79 (107)	+0.74	+0.52 (106)	+0.70 (106)	+0.63 (112)	+0.63 (108)	+0.12 (84)	+0.68 (115)	+0.65 (97)	+0.83 (88)	+0.64

TABLE II

Individual Hedonic-Frequency Correlation Coefficients (rho) for Phase I and Phase III Ratings

	PHASE I											PHASE III								
	Subject #											Subject #								
Food Group	1	2	3	4	5	6	7	8	9	10	Median	1	2	3	4	5	7	8	10	Median
Soup	+0.91 (6)	+0.77 (7)	+0.34 (7)	+1.00 (5)	+0.22 (7)	+0.50 (4)	+0.91 (8)	+0.75 (5)	+0.64 (7)	+0.92 (7)	+0.76	+0.89 (5)	+0.73 (7)	+0.63 (7)	+0.89 (9)	+1.00 (2)	+0.74 (8)	+0.39 (9)	+0.87 (9)	+0.80
Salad	+0.97 (5)	+0.87 (6)	+0.95 (6)	+0.60 (5)	+0.58 (4)	+1.00 (3)	+0.73 (6)	+0.81 (5)	+0.85 (6)	+0.84 (6)	+0.84	+0.82 (4)	+0.92 (6)	+0.53 (6)	+0.32 (6)	+0.65 (5)	+0.86 (6)	−0.43 (6)	+0.89 (6)	+0.74
Entreé	+0.78 (24)	+0.35 (24)	+0.77 (28)	+0.75 (25)	+0.39 (19)	+0.69 (23)	+0.76 (27)	+0.81 (25)	+0.33 (26)	+0.42 (20)	+0.72	+0.79 (24)	+0.19 (29)	+0.71 (28)	+0.86 (30)	+0.53 (21)	+0.89 (26)	+0.72 (27)	+0.85 (26)	+0.76
Starch	+0.89 (9)	+0.09 (12)	+0.81 (11)	+0.42 (12)	+0.65 (6)	+0.75 (9)	+0.89 (12)	+0.41 (8)	+0.85 (12)	+0.44 (10)	+0.70	+0.75 (9)	+0.13 (13)	+0.70 (12)	+0.54 (12)	+0.65 (10)	+0.88 (12)	+0.77 (10)	+0.59 (10)	+0.68
Vegetable	+0.73 (12)	+0.63 (10)	+0.57 (12)	+0.40 (11)	+0.65 (11)	+0.96 (7)	+0.95 (14)	+0.56 (11)	+0.18 (13)	+0.66 (8)	+0.64	+0.96 (10)	+0.90 (17)	+0.52 (13)	+0.71 (15)	+0.77 (11)	+0.51 (13)	+0.61 (18)	+0.83 (15)	+0.74
Bread	+0.89 (5)	−0.73 (5)	+0.58 (5)	+0.68 (5)	+0.61 (5)	+0.76 (5)	+0.35 (5)	+0.63 (5)	+0.25 (5)	+0.41 (5)	+0.60	+0.92 (5)	−0.15 (5)	+0.54 (5)	−0.40 (5)	+0.82 (5)	+0.80 (5)	0.0 (5)	+0.75 (5)	+0.64
Beverage	+0.62 (16)	+0.51 (14)	+0.70 (14)	+0.85 (15)	+0.71 (15)	+0.84 (10)	+0.77 (16)	+0.93 (11)	+0.55 (10)	+0.43 (15)	+0.70	+0.19 (16)	+0.57 (16)	+0.43 (15)	+0.72 (16)	+0.71 (12)	+0.77 (16)	+0.84 (16)	+0.72 (16)	+0.72
Dessert	+0.39 (24)	+0.05 (23)	+0.26 (24)	+0.57 (21)	+0.61 (14)	+0.54 (21)	+0.70 (22)	+0.94 (22)	+0.50 (26)	+0.01 (14)	+0.52	+0.28 (26)	+0.44 (26)	+0.61 (26)	+0.72 (26)	+0.12 (12)	+0.75 (24)	+0.43 (26)	+0.88 (24)	+0.52
All Foods	+0.75 (107)	+0.40 (107)	+0.67 (113)	+0.70 (109)	+0.69 (85)	+0.69 (88)	+0.74 (116)	+0.84 (98)	+0.55 (113)	+0.51 (89)	+0.69	+0.68 (104)	+0.44 (128)	+0.60 (117)	+0.75 (128)	+0.60 (82)	+0.86 (118)	+0.69 (125)	+0.87 (116)	+0.68

TABLE III

Preference-Choice Correlation Coefficients (rho) for Phase I Ratings (number of foods rated is given in parentheses)

	HEDONIC SCALE											FREQUENCY SCALE										
	Subject #											Subject #										
Food Group	1	2	3	4	5	6	7	8	9	10	Median	1	2	3	4	5	6	7	8	9	10	Median
Soup	+0.57 (6)	+0.45 (7)	+0.57 (6)	+0.30 (6)	−0.26 (7)	*	+0.83 (8)	+0.10 (9)	+0.86 (9)	+0.34 (7)	+0.45	+0.67 (6)	−0.42 (6)	+0.53 (6)	0.0 (5)	+0.17 (7)	*	+0.89 (8)	−0.12 (5)	+0.59 (7)	+0.33 (4)	+0.33
Salad	+0.79 (5)	+0.80 (5)	+0.47 (5)	−0.06 (6)	+0.58 (4)	+0.87 (3)	+0.75 (5)	−0.06 (4)	+0.63 (5)	+0.73 (5)	+0.68	−0.67 (5)	+0.97 (5)	+0.16 (5)	+0.12 (5)	+0.33 (4)	+0.87 (3)	+1.00 (5)	−0.50 (4)	+0.56 (5)	+0.71 (5)	+0.62
Entree	+0.70 (24)	+0.55 (26)	+0.73 (28)	+0.71 (24)	+0.02 (19)	+0.44 (27)	+0.50 (27)	+0.60 (25)	+0.81 (27)	+0.59 (26)	+0.60	+0.58 (24)	+0.06 (24)	+0.61 (28)	+0.51 (24)	+0.08 (19)	+0.18 (23)	+0.64 (27)	+0.36 (24)	+0.22 (26)	+0.27 (20)	+0.32
Starch	+0.67 (9)	+0.49 (12)	+0.25 (12)	+0.59 (12)	−0.34 (6)	+0.70 (10)	+0.65 (12)	+0.70 (10)	+0.53 (13)	+0.24 (10)	+0.56	+0.74 (9)	−0.33 (12)	+0.23 (11)	+0.41 (12)	+0.43 (6)	+0.64 (9)	+0.58 (12)	+0.29 (8)	+0.13 (12)	+0.34 (10)	+0.38
Vegetable	+0.60 (12)	+0.88 (17)	+0.44 (12)	+0.25 (13)	+0.07 (11)	+0.79 (10)	+0.44 (14)	+0.75 (17)	+0.65 (18)	+0.67 (15)	+0.62	+0.24 (11)	+0.59 (10)	+0.58 (12)	−0.23 (11)	−0.36 (11)	+0.62 (6)	+0.38 (14)	+0.62 (11)	+0.07 (13)	+0.66 (8)	+0.48
Bread	+0.87 (5)	+0.54 (5)	+0.61 (5)	+0.03 (5)	−0.40 (5)	+0.35 (5)	+0.41 (5)	+0.65 (5)	+0.70 (4)	+0.54 (5)	+0.54	+0.97 (5)	−0.55 (5)	+0.71 (5)	+0.39 (5)	0.0 (5)	+0.11 (5)	+0.92 (5)	+0.21 (5)	+0.70 (4)	−0.15 (5)	+0.30
Beverage	+0.32 (16)	+0.36 (14)	+0.59 (15)	+0.48 (15)	+0.19 (15)	+0.60 (16)	+0.62 (16)	+0.61 (16)	+0.60 (16)	+0.45 (16)	+0.54	+0.46 (16)	+0.39 (14)	+0.64 (14)	+0.41 (15)	+0.16 (15)	+0.57 (10)	+0.42 (16)	+0.45 (11)	+0.72 (10)	+0.18 (15)	+0.44
Dessert	+0.49 (22)	+0.55 (20)	+0.20 (23)	+0.48 (19)	−0.13 (13)	+0.42 (20)	+0.14 (22)	+0.57 (24)	+0.44 (24)	+0.41 (22)	+0.43	+0.24 (22)	−0.13 (20)	+0.28 (22)	+0.35 (19)	−0.24 (13)	+0.15 (19)	+0.07 (20)	+0.44 (22)	+0.03 (24)	+0.54 (13)	+0.20
All Foods	+0.50 (105)	+0.57 (112)	+0.44 (112)	+0.47 (108)	−0.05 (85)	+0.49 (101)	+0.44 (115)	+0.56 (115)	+0.63 (126)	+0.52 (113)	+0.50	+0.47 (104)	+0.11 (102)	+0.38 (109)	+0.30 (105)	−0.01 (84)	+0.31 (84)	+0.37 (113)	+0.37 (96)	+0.18 (109)	+0.22 (87)	+0.30

*Correlation coefficients could not be calculated because only one soup that was chosen had been rated.

TABLE IV

Individual Preference – Choice Correlation Coefficients (rho) for Phase III Ratings
(number of foods rated is given in parentheses)

Food Group	Hedonic Scale: Subject # 1	2	3	4	5	7	8	10	Median	Frequency Scale: Subject # 1	2	3	4	5	7	8	10	Median
Soup	+0.54 (5)	+0.32 (7)	+0.64 (6)	+0.41 (8)	+0.50 (2)	+0.63 (8)	+0.48 (9)	0.0 (9)	+0.49	+0.41 (5)	−0.16 (7)	+0.64 (6)	+0.22 (7)	+0.50 (2)	+0.59 (8)	−0.13 (9)	+0.51 (8)	+0.46
Salad	+0.26 (4)	+0.54 (5)	:0.56 (5)	+0.40 (5)	+0.75 (5)	+0.79 (5)	+0.40 (5)	+0.73 (5)	+0.55	+0.32 (4)	+0.54 (5)	+0.05 (5)	+0.40 (5)	+0.73 (5)	+0.73 (5)	−0.45 (5)	+0.82 (4)	+0.47
Entree'	+0.64 (24)	+0.62 (29)	+0.59 (28)	+0.71 (29)	+0.12 (21)	+0.55 (26)	+0.69 (26)	+0.54 (26)	+0.60	+0.50 (24)	+0.04 (29)	+0.24 (27)	+0.77 (29)	+0.19 (21)	+0.48 (26)	+0.62 (26)	+0.28 (21)	+0.38
Starch	+0.49 (9)	+0.55 (13)	+0.38 (12)	+0.35 (12)	+0.09 (10)	+0.60 (12)	+0.48 (10)	+0.24 (10)	+0.43	+0.31 (9)	−0.36 (13)	+0.50 (12)	+0.15 (12)	−0.29 (9)	+0.59 (12)	+0.51 (10)	−0.21 (10)	+0.23
Vegetable	+0.67 (9)	+0.83 (17)	+0.73 (13)	+0.12 (15)	+0.69 (11)	+0.19 (13)	+0.57 (18)	+0.74 (15)	+0.68	+0.55 (9)	+0.73 (14)	+0.40 (13)	+0.'8 (10)	+0.80 (11)	+0.44 (13)	+0.45 (18)	+0.66 (9)	+0.52
Bread	+0.89 (5)	+0.59 (5)	+0.25 (5)	−0.54 (5)	+0.23 (5)	+0.75 (5)	−0.73 (5)	−0.73 (5)	+0.24	+0.89 (5)	−0.82 (5)	+0.73 (5)	+0.23 (5)	+0.22 (5)	+0.92 (5)	−0.55 (5)	−0.43 (5)	+0.22
Beverage	+0.08 (16)	+0.73 (16)	+0.47 (15)	+0.53 (16)	+0.35 (12)	+0.61 (16)	+0.68 (16)	+0.05 (16)	+0.50	+0.20 (16)	+0.42 (15)	+0.67 (14)	+0.40 (16)	+0.53 (12)	+0.50 (16)	+0.74 (15)	+0.18 (16)	+0.46
Dessert	+0.48 (24)	+0.23 (23)	+0.32 (24)	+0.57 (24)	+0.32 (12)	−0.15 (22)	+0.49 (24)	+0.49 (24)	+0.40	+0.16 (24)	+0.15 (23)	+0.43 (24)	+0.43 (23)	+0.04 (12)	−0.18 (22)	+0.32 (24)	+0.43 (16)	+0.24
All Foods	+0.37 (102)	+0.61 (125)	+0.48 (114)	+0.43 (124)	+0.35 (83)	+0.37 (116)	+0.51 (122)	+0.46 (114)	+0.44	+0.35 (102)	+0.20 (121)	+0.37 (112)	+0.47 (117)	+0.31 (81)	+0.32 (116)	+0.39 (121)	+0.24 (94)	+0.34

DISCUSSION

As stated in the introduction of this report, the purpose of this study was four-fold: 1) to determine the reliability of the hedonic and frequency scales; 2) to determine the degree of association between the hedonic and frequency scales; 3) to determine the degree of concordance between preference ratings of a food and choice of that food during a meal; and 4) to look at individual differences with respect to each of the above questions.

With respect to the first question, the hedonic scale and the frequency scale appeared to be moderately reliable, showing median overall reliability coefficients of +0.74 and +0.64, respectively. The hedonic scale, it can be noted, was somewhat more reliable than the frequency scale. It is interesting to note that these reliability coefficients are much lower than the figures of +0.95 and +0.99 reported by Peryam, et. al. (1960). This difference is probably due to the fact that the Peryam report correlated the means of 35 to 67 foods that had been rated by over 2000 subjects, whereas the correlations of the present study were based on the individual responses of just 10 men. These results suggest that although the average hedonic value of a given food may be quite stable over time when the responses of large numbers of subjects are used in determining reliability, the responses of a given individual over time may not be as reliable.

The degree of association between the hedonic and frequency scales in this study was much higher than previously reported. For example, the median overall correlations between the two scales for Phase I and Phase II were +0.69 and +0.68, respectively. These values show only a moderate degree of association between the two scales. However, they are much higher than the +0.39 mean correlation reported by Meiselman, et. al. (1972). There are at least three reasons for this difference. One may lie in the fact that the present study used a much smaller sample than the Meiselman study, and thus the present results might be less representative. Secondly, the frequency scale used in the present study included more frequency intervals (0–30) than the Meiselman scale (1-28 but missing 10 numbers in between). Finally, in this study, the subjects judged hedonic value and frequency value in adjacent columns on the same page, rather than on different pages as in the Meiselman study. The ease of simultaneous judgment on the same food item may have increased the correlation in this study. In any case, the above discrepancy warrants further research on this question.

No previous studies have investigated the relationship between either hedonic rating and food choice or frequency rating and food choice. The present results indicated that there is a moderate degree of concordance between the hedonic scale and food choice. This is indicated by median overall correlations of +0.50 (Table III) and +0.44 (Table IV). There appears to be a moderately low relationship between ratings on the frequency scale and actual food choice, the values being +0.30 (Table III) and +0.34 (Table IV). It appears then, that the hedonic scale can be used with some degree of confidence in helping to make decisions concerning what foods should be served to military personnel whereas the frequency scale should be used with somewhat less confidence in making such decisions. The small number of subjects involved in the present study, however, would certainly preclude one from making any firm decisions regarding these scales at the present time. The results should only be used with caution until further research clarifies their validity.

Finally, with respect to the fourth question, concerning individual differences, it appears that, as a whole, most individuals show a certain degree of similarity in terms of their overall responses to foods. For example, with respect to reliability, 6 of 8 subjects had reliability coefficients for All Foods in the range of +0.70 to +0.81 on the hedonic scale (Table I). Although the range on the frequency scale was somewhat larger, it still only extended from +0.63 to +0.83 for 6 of 8 subjects. The only marked exception was subject 5, who, as noted earlier, reported that he had not tried a large number of the items which he was asked to rate.

Although, with respect to reliability, there was a fair amount of similarity between individuals when all foods were considered, there were a great many differences among them when a given food class was considered. For example, the reliability coefficients for Bread ranged from −0.56 to +0.87 (Table I) on the hedonic scale and from +0.30 to +1.00 on the frequency scale (again excluding subject #5 whose responses were usually extremely divergent from the others). In addition, different food classes showed different ranges. Bread had the largest range, while Entreé and Starch had the smallest. This was true for both the hedonic scale and the frequency scale.

With respect to the degree of association between the hedonic and frequency scales, individuals appeared to be somewhat dissimilar, with the overall correlations ranging from +0.40 to +0.84 for Phase I and from +0.44 to +0.87 for Phase III (Table II). Again, the correlations within a given food group differed extremely from subject to subject, with Bread again showing the largest variation between individuals and Entreé showing the least.

A similar situation existed for the preference-choice correlations. The overall correlations for both hedonic and frequency scales only ranged approximately 20 points across subjects (Tables III and IV). Within given food classes, however, the range across individuals was very large. On the hedonic scale the most similarity was again with Entreé and the most dissimilarity with Breads. On the other hand, with the frequency scale the subjects were most similar on Beverage (Table III) and Vegetable (Table IV), although Bread again showed the most dissimilarity.

In general, then, it appears that when all foods are considered at once there is some similarity among individuals in terms of how reliable they are over time in stating their food preferences. However, the reliability of individual responses is not nearly as high as the reliability of average group responses. Additionally, there is a degree of similarity between individuals in terms of the extent to which they rate foods similarly on the hedonic and frequency scales with the overall correlation between hedonic and frequency scale ratings being much higher than previously reported by other investigators.

The subjects are consistent in that they all show moderately low correlations between food preference ratings and food choice across all foods. However, when individual food classes are examined the consistency across individuals declines and ranges from a moderate consistency among individuals in their responses to Entreé to a very large discrepancy among individuals in their responses to Bread.

It should be noted again that this study is the first of a planned series of small sample studies involving a detailed analysis of food related behaviors of individual subjects. As more studies in this series are completed and a larger subject pool accumulated, the usefulness of the small sample approach to these problems will become more apparent. First, we will discover whether the large group data pool can in fact be constructed from accumulating subjects of small samples taken over time. More importantly, we will find out if it is profitable to fractionate the cumulative small samples into subset populations based upon demographic or other individually defined variables. For example, is there some common food habit characteristic among those subjects who have poor correlations between preference and consumption as opposed to those subjects for which preference scores have a consistently high predicative value for consumption.

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APPENDIX A

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

	Food Item		Not Tried (✓)	Like - Dislike Rating (1-9)	Days/per Month (0-30)
1.	Cottage Fried Potatoes	1-4			
2.	Baked veal loaf w/mushroom gravy	1-8			
3.	Buttered peas	1-12			
4.	Mousseline au Chocolat	1-16			
5.	Open face blueberry pie	1-20			
6.	Chicken cacciatore	1-24			
7.	Lettuce & tomato salad w/ French dressing	1-28			
8.	White bread	1-31			
9.	Potato chips	1-36			
10.	Barbequed beef on toasted roll	1-40			
11.	Chocolate milk	1-44			
12.	Tomato vegetable soup	1-48			
13.	Grilled cheeseburger	1-52			
14.	Garlic croutons	1-56			
15.	Baked potato w/ sour cream	1-60			
16.	Orange gelatin	1-64			
17.	Western sandwich	1-68			
18.	Cauliflower au gratin	1-72			
19.	Vanilla milk shake	2-4			

APPENDIX B

MONDAY - MIDDAY MEAL NAME/NUMBER _____

*Beef Barley Soup.....____
Croutons.....____

*Baked Virginia Ham with Pineapple
Raisin Sauce.....____
Grilled Frankfurter on Toasted Roll..____
Chili Dog on Steamed Roll.....____

*Buttered Carrots.....____
*Green Beans with Mushrooms.....____

Candied Sweet Potatoes.....____
Butter Whipped Potatoes.....____
Potato Chips.....____

*Orange Gelatin.....____
*Strawberry Gelatin.....____
*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....____
Butter.....#____pats

Butterscotch Pudding.....____
Pineapple Upside Down Cake.....____
Chocolate Pie w/Whipped Cream.....____
Chocolate Sundae with Topping.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

Appendix C

SOCIAL SECURITY NUMBER_____ DATE_____

GRADE_____

AGE_____

WEIGHT_____lbs

HEIGHT_____ft_____in

ARE YOU ON SEPARATE RATIONS? Yes_____ No_____

CIRCLE THE NUMBER WHICH INDICATES YOUR HIGHEST LEVEL OF EDUCATION:

1. Some Grade School
2. Finished Grade School
3. Some High School
4. High School Graduate
5. Skilled Job Training
6. Some College
7. College Graduate
8. Beyond College

WHERE DID YOU SPEND MOST OF THE TIME BEFORE YOU ENTERED THE SERVICE? CIRCLE THE NUMBER OF YOUR ANSWER.

1. On a farm
2. In the country, but not on a farm
3. In a town with less than 2,500 people
4. In a town or small city with more than 2,500 but less than 25,000 people
5. In a city with more than 25,000 but less than 100,000 people
6. In a large city with more than 100,000 but less than one million people
7. In a very large city with over one million people
8. In a suburb of a large or very large city

IN WHAT REGION DID YOU LIVE THE LONGEST TIME BEFORE YOU JOINED THE NAVY? CIRCLE THE NUMBER OF YOUR ANSWER.

1. Northwest (Oreg., Wash., Idaho)
2. Rocky Mts. (Nev., Colo., Wyo., Utah, Mont.)
3. South Central (Texas, La., Okla., Ark.)
4. Southwest (Calif., N. Mex., Ariz.)
5. Great Plains (Mo., Iowa, Kans., Nebr.)
6. North Central (N. Dak., S. Dak., Minn.)
7. Middle West (Ill., Ohio, Wis., Mich., Ind.)
8. Southeast (Miss., Ala., Tenn., Fla., N.C., Va., Ga., Ky., S.C.)
9. East Central (Pa., N.Y., N.J., Del., W. Va., Md.)
10. New England (Maine, Mass., N.H., Vt., R.I., Conn.)
11. Alaska or Hawaii
12. Other U.S. territories or possessions (For example, Puerto Rico or Virgin Islands)
13. Outside the U.S. or U.S. territories o possessions.

WHAT TYPE OF COOKING WERE YOU RAISED ON? CHECK ONE

1. American Indian	_____	11. Jewish	_____
2. Chinese	_____	12. Mexican	_____
3. English	_____	13. New England	_____
4. French	_____	14. Polynesian	_____
5. General American Style	_____	15. Polish (& Eastern Europe)	_____
6. German	_____	16. Soul	_____
7. Greek	_____	17. Southern	_____
8. Indian	_____	18. Spanish (non Mexican)	_____
9. Italian	_____	19. Other (please write in)	_____
10. Japanese	_____	_____	

WHAT TYPE OF RESTAURANTS DO YOU GO TO MOST FREQUENTLY?

	Often	Sometimes	Never
SNACK (e.g. MacDonald's)_____	☐	☐	☐
ETHNIC (e.g. Italian, Chinese_____	☐	☐	☐
STANDARD, NON ETHNIC_____	☐	☐	☐

IN THE FOLLOWING BOXES, CHECK THE MEALS WHICH YOU EAT AT THE MILITARY DINING HALL DURING A TYPICAL WEEK:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Breakfast							
Dinner							
Supper							

FOR MEALS MISSED AT MILITARY DINING HALL, HOW MANY MEALS PER WEEK DO YOU EAT AT?
(Put average number of meals down)

RESTAURANT ON BASE_____ RESTAURANT IN TOWN_____

HOME COOKING_____ DO NOT EAT THAT MEAL AT ALL_____

APPENDIX D

Name/Number_____

FOOD PREFERENCE SURVEY

The Natick Laboratories are involved in a research program to study food service systems in all of the services; with the general goal of obtaining information which will allow continuous improvement of food quality.

We have recently been asked to start some work with Navy dining halls and have arranged to begin this work in Davisville. We are pleased that you have volunteered to assist us.

We are interested in studying your food preferences and acceptability. With your help we can begin to collect data which will help the Armed Forces in general, and you specifically, by continuing to improve your dining system.

This survey includes two questionnaires, (a) A Food Preference Questionnaire for Single Food Items, and (b) A Food Preference Questionnaire for Food Selections from Menus.

You will note that many of the items are those which you are served on a daily basis, while some may be unfamiliar, or of a gourmet variety not served you at present. Since we are interested in the dining hall of the future as well as the present, we are including samples of many classes of foods.

For example:

(a) If you have tried Ice Cream and it is one of your favorite foods, (b) if you have never heard of or never tried O'Brien Potatoes, and (c) if you have tried Broccoli but really disliked it, you might answer as follows:

Food Item	Not Tried (✓)	Like/Dislike Rating (1-9)	Days per Month (0-30)
Ice Cream		8	25
O'Brien Potatoes	✓		
Broccoli		2	0

Remember rate all foods that you have eaten in the past. If you have not eaten a particular food or do not recognize the name, place a check (✓) in the appropriate column along side of the food item. Also if you have tried a food item and never want to eat that food item again, rate it first expressing your dislike, then place a "0" in the days per/month column along side of that item.

Think of the food items in terms of your general preferences rather than in terms of any particular time you have eaten them.

You are now ready to start.

If you have any questions, ask the person administering the survey to help you.

Turn to the next page and begin.

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

Food Item		Not Tried (✓)	Like - Dislike Rating (1-9)	Days/per Month (0-30)
1. Cottage Fried Potatoes	1-4			
2. Baked veal loaf w/mushroom gravy	1-8			
3. Buttered peas	1-12			
4. Mousseline au Chocolat	1-16			
5. Open face blueberry pie	1-20			
6. Chicken cacciatore	1-24			
7. Lettuce & tomato salad w/ French dressing	1-28			
8. White bread	1-31			
9. Potato chips	1-36			
10. Barbequed beef on toasted roll	1-40			
11. Chocolate milk	1-44			
12. Tomato vegetable soup	1-48			
13. Grilled cheeseburger	1-52			
14. Garlic croutons	1-56			
15. Baked potato w/ sour cream	1-60			
16. Orange gelatin	1-64			
17. Western sandwich	1-68			
18. Cauliflower au gratin	1-72			
19. Vanilla milk shake	2-4			

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

	Food Item		Not Tried (✓)	Like – Dislike Rating (1-9)	Days/per Month (0-30)
20.	Croutons	2-8			
21.	Puree of lima bean soup	2-12			
22.	Non-carbonated grape drink	2-16			
23.	Brown beef stew	2-20			
24.	Lettuce & tomato salad w/ blue cheese dressing	2-24			
25.	Buttered succotash	2-28			
26.	Chili dogs	2-32			
27.	Non-carbonated orange drink	2-36			
28.	Rolls	2-40			
29.	Vegetable soup	2-44			
30.	Southern style green beans	2-48			
31.	Hot tea	2-52			
32.	Butter-whipped potatoes	2-56			
33.	French apple pie	2-60			
34.	Butterscotch pudding	2-64			
35.	Strawberry chiffon pie	2-68			
36.	Cod liver oil provencale	2-72			
37.	Baked Virginia ham w/pineapple raisin sauce	3-4			

Name/Number_____

Food Preference Questionnaire
(Single Food Item Ratings)

On the following pages, you will be asked how much you <u>like</u> a food item and how <u>often</u> you would like to eat that item.

On the top of each page, you will have a scale for rating how much you like or dislike the various food items, as shown below:

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

Then you will be presented with a series of food items to rate as indicated in the following example:

Use the rating scale given above. Enter the number of the phrase which best describes how much you like the food item.

If you have not eaten a particular food or don't recognize the name, place a check (✓) in the column.

Approximately how many days a month would you like to eat this food item?

Food Item	Not Tried (✓)	Like/Dislike Rating (1-9)	Days per Month (0-30)
Ice Cream			
O'Brien Potatoes			
Broccoli			

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

Food Item			Not Tried (✔)	Like - Dislike Rating (1-9)	Days/per Month (0-30)
38.	Root beer	3-8			
39.	O'Brien potatoes	3-12			
40.	Butter	3-16			
41.	Pineapple chiffon pie	3-20			
42.	Buttered carrots	3-24			
43.	Candied sweet potatoes	3-28			
44.	Coconut pudding	3-32			
45.	Beef barley soup	3-36			
46.	Beef paprika	3-40			
47.	Green beans w/mushrooms	3-44			
48.	Cream puffs	3-48			
49.	Pork roast	3-52			
50.	Baked pork and beans	3-56			
51.	Cherry pie	3-60			
52.	Southern fried okra	3-64			
53.	Banana milk shake	3-68			
54.	Sweet and sour spare ribs	3-72			

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

Food Item			Not Tried (✓)	Like - Dislike Rating (1-9)	Days/per Month (0-30)
55.	CBC grinder	4-4			
56.	Grilled frankfurter	4-8			
57.	French fried shrimp	4-12			
58.	Cherry gelatin	4-16			
59.	Jelly roll	4-20			
60.	Baked corn & tomatoes	4-24			
61.	Rissoli potatoes	4-28			
62.	Lettuce & tomato salad w/thousand island dressing	4-32			
63.	Baked macaroni and cheese	4-36			
64.	Southern style mustard greens	4-40			
65.	French bread	4-44			
66.	Fish sandwich w/dill tartar sauce	4-48			
67.	Lime gelatin	4-52			
68.	Chocolate ice cream sundae	4-56			
69.	Orange drink	4-60			
70.	Coke	4-64			
71.	Buttered wax beans	4-68			
72.	Chilled pear halves	4-72			

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

Food Item			Not Tried (✓)	Like - Dislike Rating (1-9)	Days/per Month (0-30)
73.	Buttered mixed vegetables	5-4			
74.	Fried summer squash	5-8			
75.	Ham salad in frankfurter roll	5-12			
76.	Hot roast beef sandwich w/brown gravy	5-16			
77.	Grilled cheese sandwich	5-20			
78.	Pork chops mexicana	5-24			
79.	Buttered noodles	5-28			
80.	Mexican corn	5-32			
81.	Cole slaw	5-36			
82.	Pineapple upside down cake	5-40			
83.	Coffee	5-44			
84.	Au chaud-froid	5-48			
85.	French fried potatoes	5-52			
86.	Lemon gelatin	5-56			
87.	Baked salmon loaf	5-60			
88.	Sauteed mushrooms w/onions	5-64			
89.	Navets a'l'Etuvee	5-68			
90.	Stuffed cabbage rolls	5-72			

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

Food Item			Not Tried (✔)	Like - Dislike Rating (1-9)	Days/per Month (0-30)
91.	Chicken rice soup	6-4			
92.	Butterscotch pie	6-8			
93.	Grilled hamburger	6-12			
94.	Hot biscuits	6-16			
95.	Dark bread	6-20			
96.	Strawberry gelatin	6-24			
97.	Pepper pot soup	6-28			
98.	Pate' de Foie Gras	6-32			
99.	Scallopped noodles w/cheese, tomatoes, & bacon	6-36			
100.	Vanilla pudding	6-40			
101.	Chilled macaroni salad	6-44			
102.	French onion soup	6-48			
103.	Strawberry milk shake	6-52			
104.	Sprite	6-56			
105.	Broccoli w/mock hollandaise sauce	6-60			
106.	Parmesan croutons	6-64			
107.	Escargots	6-68			
108.	Chocolate pie w/whipped cream	6-72			

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

	Food Item		Not Tried (✓)	Like - Dislike Rating (1-9)	Days/per Month (0-30)
109.	Cold platter of salami, bologna & swiss cheese	7-4			
110.	Bouillabaisse	7-8			
111.	Lime gelatin	7-12			
112.	Steamed buttered rice	7-16			
113.	Reuben sandwich	7-20			
114.	Bacon croutons	7-24			
115.	Iced tea	7-28			
116.	Spice cake w/lemon bu ter icing	7-32			
117.	Baked halibut w/lemon butter	7-36			
118.	Water	7-40			
119.	Glazed carrots	7-44			
120.	Milk	7-48			
121.	Bread pudding w/nutmeg sauce	7-52			
122.	Golden brown fish portions	7-56			
123.	Apricot crisp	7-60			
124.	French fried carrot sticks	7-64			
125.	Lemon cake w/butter cream icing	7-68			
126.	Potatoes au gratin	7-72			

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

	Food Item		Not Tried (✔)	Like - Dislike Rating (1-9)	Days/per Month (0-30)
127.	Baked haddock w/parsley sauce	8-4			
128.	Coq au Vin	8-8			
129.	Hot chocolate	8-12			
130.	Lettuce & tomato salad w/oil & vinegar dressing	8-16			
131.	Oatmeal cookies	8-20			
132.	Molasses cookies	8-24			
133.	Banana fruit cup	8-28			
134.	Chocolate milk shake	8-32			
135.	Beef noodle soup	8-36			
136.	Raspberry gelatin	8-40			
137.	Seasoned pinto beans w/ham chunks	8-44			
138.	Sliced tomatoes & hardcooked eggs on lettuce leaf	8-48			
139.	Grilled steak	8-52			
140.	New England clam chowder	8-56			
141.	Tranches de Jambon	8-60			
142.	French fried onion rings	8-64			
144.	Buttered peas	8-72			
145.	Squaw corn & spaghetti	9-4			

Name/Number_____

COMMENTS

We would like to thank you for giving us this information about your food preferences. Since this is part of a research project where we are trying to improve our questionnaire and survey techniques, as well as collecting data, we would like your thoughtful appraisal of the task you have just performed.

If you understood all of the instructions, and had no trouble with it, no comment is necessary. However, if you have comments that will help us improve this questionnaire for later use, please write them out.

Some areas for comment could be: Too long? Too short? Too complicated? Too simple? Too tiring? Instructions o.k.? If possible, specific suggestions for improvement would be appreciated.

Thank you.

(Use back of page if necessary)

Name/Number_____

Food Preference Questionnaire

(Food Selection from Menus)

In this section, we are interested in your food preferences in terms of groups of foods arranged in menu form. Do each page separately, looking over the group of items, and select a combination of foods as though you were actually going to eat that typical meal (e.g., Midday) on a typical day (e.g., Tuesday).

The items are listed in logical groups (e.g. soup, main dish, vegetable, potato, salad, bread, drink, etc.).

Assume complete free choice, as though you were in a restaurant with no restrictions. Select the complete combination you wish to eat, including seconds, if desired, putting down everything you would want. Include, for example, things like number of glasses of water in addition to drinks (soft drink, coffee, etc.), number of pats of butter in addition to slices of bread or rolls, etc.

Feel free to take as little or as much as you like, depending upon your personal food preferences and food habits.

The food items are on the left side of each page with a blank on the right. For example, if you want one helping of cole slaw, put 1 in the blank, want seconds on chicken, put 2 in the blank, or want four pats of butter put a 4 in the blank, etc. (see example below).

Cole Slaw.....1

Chicken.....2

Butter.....4 pats

Each page contains a list of items from which to select a meal. Take each page in sequence, selecting your meal on that page before going on to the next page.

You are now ready to start. If you have any questions, ask the person administering the survey to help you.

Turn to the next page and begin.

MONDAY - MIDDAY MEAL NAME/NUMBER _____

*Beef Barley Soup.....____
Croutons.....____

*Baked Virginia Ham with Pineapple
Raisin Sauce.....____
Grilled Frankfurter on Toasted Roll..____
Chili Dog on Steamed Roll.....____

*Buttered Carrots.....____
*Green Beans with Mushrooms.....____

Candied Sweet Potatoes.....____
Butter Whipped Potatoes.....____
Potato Chips.....____

*Orange Gelatin.....____
*Strawberry Gelatin.....____
*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....____
Butter.....#____pats

Butterscotch Pudding.....____
Pineapple Upside Down Cake.....____
Chocolate Pie w/Whipped Cream.....____
Chocolate Sundae with Topping.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

MONDAY - EVENING MEAL NAME/NUMBER _____

*Vegetable Soup.....____
Bacon Croutons.....____

Stuffed Cabbage Rolls.....____
*Baked Haddock w/Parsley Sauce.....____
Western Sandwich.....____
Barbecued Beef on Toasted Roll.....____

*Buttered Peas.....____
Squaw Corn and Spaghetti.....____

O'Brien Potatoes.....____
French Fried Potatoes.....____

Cole Slaw.....____
*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....#____
Butter.....#____pats

Spice Cake w/ Lemon Butter Icing.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

TUESDAY - MIDDAY MEAL NAME/NUMBER _____

*Chicken Rice Soup.....____

Pork Chop Mexicana.....____
*Golden Brown Fish Portions.....____
Cold Platter of Potato Salad,
Sliced Rolled Salami, Bologna and
Swiss Cheese.....____
*Sliced Tomatoes & Hard Cooked Eggs
on Lettuce Leaf.....____
Baked Pork & Beans.....____

*Buttered Mixed Vegetables.....____

Baked Macaroni & Cheese.....____
French Fried Onion Rings.....____

*Lime Gelatin.....____
*Raspberry Gelatin.....____
*Lettuce & Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices.
French Bread.....#____
Butter.....#____pats

Bread Pudding with Nutmeg Sauce.....____
Strawberry Chiffon Pie .....____
Cream Puffs.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

TUESDAY - EVENING MEAL NAME/NUMBER _____

*French Onion Soup.....____
Croutons.....____

*Hot Roast Beef Sandwich with Brown
Gravy.....____
Grilled Cheeseburger on Toasted Roll.____
Grilled Hamburger on Toasted Roll....____

Broccoli with Mock Hollandaise Sauce.____
*Buttered Wax Beans.....____

*Steamed Buttered Rice.....____
Rissole Potatoes.....____
French Fried Potatoes.....____

*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....#____
Butter.....#____pats

*Chilled Pear Halves.....____
Molasses Cookies.....____
Chocolate Milk Shake.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

WEDNESDAY - MIDDAY MEAL NAME/NUMBER_____

*Pepper Pot Soup.....____
Garlic Croutons.....____

Chicken Cacciatore.....____
Reuben Sandwich.....____
Fish Sandwich with Dill Tartar Sauce.____

Southern Fried Okra.....____
*Mexican Corn.....____

Buttered Noodles.....____
French Fried Potatoes.....____

*Orange Gelatin.....____
*Cherry Gelatin.....____
*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....#____
Butter.....#____pats

Vanilla Pudding.....____
Open Face Blueberry Pie.....____
Pineapple Chiffon Pie.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

WEDNESDAY - EVENING MEAL NAME/NUMBER _____

*Tomato Vegetable Soup.....____
Garlic Croutons.....____

Sweet and Sour Spare Ribs.....____
Beef Paprika.....____
Ham Salad in Frankfurter Roll.....____
Grilled Frankfurter on Toasted Roll..____

Glazed Carrots.....____
Fried Summer Squash.....____

Cottage Fried Potatoes.....____
Potato Chips.....____

*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....#____
Butter.....#____pats

Lemon Cake with Butter Cream Icing...____
Vanilla Milk Shake.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

*Dieter's Choice

THURSDAY - ~~MIDDAY~~ MEAL NAME/NUMBER_____

Vegetable Soup.....____

Oven Roast of Pork with Rich Pork Gravy.....____
C.B.C. Grinder.....____
Baked Pork and Beans.....____

*Buttered Succotash.....____
French Fried Carrot Sticks.....____

*Baked Potato with Sour Cream.....____
Potato Chips.....____

Chilled Macaroni Salad.....____
*Lime Gelatin.....____
*Cherry Gelatin.....____
*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....#____
Butter.....#____pats

French Apple Pie.....____
Butterscotch Pie.....____
*Banana Fruit Cup.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

THURSDAY - EVENING MEAL NAME/NUMBER_____

Puree of Lima Bean Soup.....____

Grilled Steak to order.....____
Grilled Cheeseburger on Toasted Roll.____
Grilled Hamburger on Toasted Roll....____

Buttered Peas.....____
Cauliflower au Gratin.....____
Sauteed Mushrooms with Onions.....____

French Fried Potatoes.....____

*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....#____
Butter.....#____pats

*Chilled Pears.....____
Oatmeal Cookies.....____
Strawberry Milk Shake.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

FRIDAY - MIDDAY MEAL NAME/NUMBER_____

*Beef Noodle Soup.....____

Baked Salmon Loaf.....____
*Baked Halibut with Drawn Lemon Butter Sauce.....____
Baked Veal Loaf with Mushroom Gravy..____
Chili Dog on Steamed Roll.....____
Grilled Cheese Sandwich.....____

Southern Style Green Beans.....____
Baked Corn and Tomatoes.....____

Potatoes au Gratin.....____
Potato Chips.....____

*Raspberry Gelatin.....____
*Lemon Gelatin.....____
*Lettuce and Tomato Salad,.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Rolls.....#____
Butter.....#____pats

Coconut Pudding.....____
Cherry Pie.....____
Jelly Roll.....____
Banana Milk Shake.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

FRIDAY - EVENING MEAL NAME/NUMBER: _____

*New England Clam Chowder.....____
Parmesan Croutons.....____

French Fried Shrimp.....____
Brown Beef Stew.....____

*Southern Style Mustard Greens.....____

Scalloped Noodles with Cheese,
Tomatoes and Bacon.....____
*Seasoned Pinto Beans with Ham Chunks____

*Lettuce and Tomato Salad.....____
Dressing: French.....____
Blue Cheese.....____
Thousand Island.....____
Oil and Vinegar.....____

White Bread.....#____slices
Dark Bread.....#____slices
Hot Biscuits.....#____
Butter.....#____pats

Peach Shortcake with Whipped Cream..____
Apricot Crisp.....____

Water.....____
Milk.....____
Chocolate Milk.....____
Tea.....____
Iced Tea.....____
Hot Chocolate.....____
Coffee.....____
Coke.....____
Root Beer.....____
Sprite.....____
Orange.....____
Non-carbonated Orange.....____
Non-carbonated Grape.....____

* Dieter's Choice

Name/Number _____

COMMENTS

(A) We would like to thank you for giving us your meal choices from the groups of items listed on the above pages. Since this is part of a research project where we are trying to improve our questionnaire and survey techniques, as well as collecting data, we would like your thoughtful appraisal of the task you have just performed.

If you understood all of the instructions, and had no trouble with it, no comment is necessary. However, if you have comments that will help us improve this questionnaire for later use, please write them out.

(Use back of page if necessary)

(B) You have just completed selection of a series of sample meals, based upon your food preferences and food habits.

We would now like to see if you can comment on some of the general reasons for your selection of these items. For example, some of the things that may have been important to your selection might have been on the following list.

Mark Yes or No in the blank by each reason and comment if you wish. It will be helpful to us if you could add reasons that we have not thought up. If you can think of any, list them at the end.

1. QUALITY _____

2. FLAVOR _____

3. AROMA _____

COMMENTS (Cont'd)

4. TASTE _____

5. COLOR _____

6. TEXTURE (Chewiness, etc.)_____

7. NUTRITION _____

8. HOW FILLING IT IS _____

9. CALORIES _____

10. PROTEIN CONTENT _____

11. FAT CONTENT _____

12. CARBOHYDRATE CONTENT _____

13. THE PARTICULAR DAY (e.g. Tues.) _____

14. THE PARTICULAR MEAL (e.g. Midday) _____

15. HOW HUNGRY WHEN FILLING IT OUT _____

16. SEASON OF THE YEAR _____

17. COMBINATIONS OF ITEMS AVAILABLE FOR CHOICE (e.g. potatoes and gravy; meat and potatoes) _____

18. OTHERS _____

(Use back of page if necessary)

(C) Comments on "Dieter's Choice" items.

On the previous pages, we have listed some items as "Dieter's Choice". We would like your answer to the following questions.

(1) Are you familiar with term "Dieter's Choice"?_____

Have you seen it used before? _____

Where? _____

(2) What does the term "Dieter's Choice" mean to you?_____

(3) Do you like the idea of "Dieter's Choice" on menus?_____

If No, explain. If Yes, should it be used in all dining situations? _____

Would you base food choices on it? _____

Would others? _____ Who? _____

Name/Number _____

Meal Evaluation - Introduction

A short time ago, you were asked to supply information about your food preferences for a large group of single food items and groups of items arranged in menus.

These paper and pencil questionnaire techniques are helpful to us. In addition, we now wish to get your reaction to some actual menus that are served here. In this manner we can begin to relate your comments about your food preferences for single food items and meals in general with your reactions to the actual foods served to you.

It is only in the actual meal can we study food preferences in a situation where we can get your reactions to food quality "on the spot" so to speak, and relate it to our general interest in improving your dining system, helping establish standards of portion control in line with food preferences, and so on.

Name/Number _____

Date _____

Day _____

Meal _____

Meal Evaluation

You have just finished this meal. While it is fresh on your mind, we would like your comments on it.

(1) Rate the whole meal on the nine point scale you used for single items in the questionnaire you took previously. Fill in the blank below the scale.

1	2	3	4	5	6	7	8	9
dislike extremely	dislike very much	dislike moderately	dislike slightly	neither like nor dislike	like slightly	like moderately	like very much	like extremely

My rating of this meal is _____

(2) Comment on the meal in general. List any particular item or items you may not have liked, even though you selected it for this meal. The following include some of the reasons you may not have eaten some of these items. (In some cases you may have eaten it and still disliked it).

(A) The portion was too large!
(B) My eyes were bigger than my stomach!
(C) I wasn't hungry!
(D) It's quality and flavor were bad. How?
(E) It was overcooked, undercooked!
(F) It was too hot, too cold!

Meal Evaluation Cont'd

Use the following as a guide on any item you may wish to comment on:

Item	How much did you eat of it?	Comment

Meal Evaluation Cont'd)

Item	How much did you eat of it?	Comment

FOOD SELECTION DATA SHEET

Monday — Evening Meal

NAME/NUMBER _____

	Taken/ Left (oz.)	Eaten
*Vegetable Soup		
Bacon Croutons		
Stuffed Cabbage Rolls		
*Baked Haddock w/Parsley Sauce		
Western Sandwich		
Barbecued Beef on Toasted Roll		
*Buttered Peas		
Squaw Corn and Spaghetti		
O'Brien Potatoes		
French Fried Potatoes		
Cole Slaw		
*Lettuce and Tomato Salad		
Dressing: French		
Blue Cheese		
Thousand Island		
Oil and Vinegar		
White Bread		
Dark Bread		
Rolls		
Butter		
Spice Cake w/ Lemon Butter Icing		
Water		
Milk		
Chocolate Milk		
Tea		
Iced Tea		
Hot Chocolate		
Coffee		
Coke		
Root Beer		
Sprite		
Orange		
Non-carbonated Orange		
Non-carbonated Grape		

* Dieter's Choice

Name/Number _____

POST MEAL EVALUATION[1]

FOOD PREFERENCE SURVEY

Over the past two weeks you have had lots of experience in thinking about your food likes and dislikes, initially when we asked you to tell us about your food preferences for single items and sample selections from menus, and last week when we asked you to comment on food quality in many of the actual meals you ate.

We would again like you to comment on your food preferences in questionnaires on single food items and selection from menus. Many of the items are obviously the same as you filled out before. Look at each item and respond to it as you now feel when asked the question. Whether your response is the same as before, or whether it is different because of your experience in thinking about foods last week is unimportant. Think about how you now feel about each item and put it down, without reference to last week.

If you insist that your response is similar or different specifically because of your experience in thinking about foods with us last week, put a brief note by the item, explaining it. This shouldn't happen too often. If it does, discuss it with the person administering the survey.

[1] These instructions preceded the second administration of the surveys.